

## PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-141624

(43)Date of publication of application : 03.06.1997

(51)Int.Cl.

B28B 1/26  
B28B 3/02

(21)Application number : 07-303138

(71)Applicant : ASAHI GLASS CO LTD

(22)Date of filing : 21.11.1995

(72)Inventor : KIYOZAWA MOTOKI  
MATSUDA TATSUYUKI  
SUMIKOSHI MASASHI

### (54) MANUFACTURE OF HYDRAULIC INORGANIC MOLDED PLATE

#### (57)Abstract:

**PROBLEM TO BE SOLVED:** To manufacture a hydraulic inorganic molded plate excellent in designedness with a high productivity by a method wherein slurry-like hydraulic stock is fed in a bottom mold having an uneven pattern so as to be formed into a pre-molded body by being pre-pressed and finally normally pressed, resulting in transferring the uneven pattern of the bottom mold.

**SOLUTION:** First of all, after a bottom mold 12 having an uneven pattern is fixed onto a plate 10, an outer frame 14 is fixed to the bottom mold 12 so as to place hydraulic stock 16 in a container made of the bottom mold 12 and the outer frame 14. After that, a pre-molded body 22 is formed by pre-pressing the hydraulic stock 16 with the top mold 20 of a pre-pressing device. The excess water in the hydraulic stock 16 is removed outside the outer frame 14 through a punching metal and dehydrating holes. Next, after the outer frame 14 is moved, the pre-molded body 22 is carried below a normal pressing device 38 so as to be finally pressed with the upper frame 40 of the normal pressing device 38 accompanied by the forcible dehydration of excess water in order to be turned into a hydraulic inorganic molded plate 42.



### LEGAL STATUS

[Date of request for examination]

04.03.2002

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

\* NOTICES \*

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

CLAIMS

---

[Claim(s)]

[Claim 1] the female mold which has a concavo-convex pattern — a hydraulic slurry-like raw material — supplying — dehydration of a punch and an outer frame — the manufacture method of the hydraulic minerals fabrication board characterized by to manufacture the surface-type-like hydraulic minerals fabrication board with which the preliminary press was carried out, the preforming object was formed, removing a redundant water from a hole, the actual press of the aforementioned preforming object was subsequently carried out, and the concavo-convex pattern of the aforementioned female mold was imprinted

[Claim 2] while the porosity board connected to vacuum devices is formed in the aforementioned punch and carrying out suction removal of the aforementioned redundant water through this porosity board — dehydration of the aforementioned outer frame — the manufacture method of the hydraulic minerals fabrication board according to claim 1 characterized by a hole being a breakthrough of a large number formed in the circumference [ outer frame ] side

[Claim 3] The manufacture method of the hydraulic minerals fabrication board according to claim 1 characterized by preventing mold collapse of a preforming object by forming a taper-like taper side in the inner skin of the aforementioned outer frame towards the aforementioned punch, and forming the longitudinal section of the aforementioned preforming object in a trapezoid configuration.

---

[Translation done.]

\* NOTICES \*

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

DETAILED DESCRIPTION

---

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the manufacture method of the hydraulic minerals fabrication board used as outer wall material for residences.

[0002]

[Description of the Prior Art] After the manufacture method of a hydraulic minerals fabrication board of having a concavo-convex pattern on a front face supplying a hydraulic slurry-like raw material to female mold generally and carrying out preliminary dehydration from female mold, the method of carrying out pressurization dehydration by the punch which has a concavo-convex pattern on a front face is learned.

[0003]

[Problem(s) to be Solved by the Invention] However, the concavo-convex pattern of a punch is not imprinted with a precision sufficient to a Plastic solid, but is inadequate in respect of surface design nature, and, in the case of a deep-drawing pattern, there is a fault that precision becomes bad especially. [ of the manufacture method of the aforementioned conventional hydraulic minerals fabrication board ] on the other hand, the female mold in which an applicant for this patent has a concavo-convex pattern — a hydraulic slurry-like raw material — supplying — a punch to a redundant water — nature — and — or the manufacture method of manufacturing the surface type-like hydraulic minerals fabrication board with which the preliminary press was carried out, the preforming object was formed, the actual press of the preforming object was subsequently carried out, and the female mold pattern was imprinted is proposed, removing compulsorily (Japanese Patent Application No. No. 33972 [ seven to ])

[0004] However, by the aforementioned manufacture method, although surface design nature can be raised, since it starts removing the redundant water of a hydraulic raw material for a long time, there is a fault of a low in productivity. this invention was made in view of such a situation, and aims at offering the manufacture method of a hydraulic minerals fabrication board that the hydraulic minerals fabrication board excellent in design nature can be manufactured with sufficient productivity.

[0005]

[Means for Solving the Problem] the female mold which has a concavo-convex pattern in order that this invention may attain the aforementioned purpose — a hydraulic slurry-like raw material — supplying — dehydration of a punch and an outer frame — — a preliminary press is carried out and it is characterized by to manufacture the surface-type-like hydraulic minerals fabrication board with which the preforming object was formed, the actual press of the aforementioned preforming object was subsequently carried out, and the concavo-convex pattern of the aforementioned female mold was imprinted, removing a redundant water from a hole

[0006] In this invention, it is desirable in supplying a hydraulic slurry-like raw material to female mold to use a hydraulic raw material, adjusting so that a solid content may become 10 - 30% of the weight. Since super-\*\*\*\*\* and a fluidity fall 30% preferably since it is needed for dehydration in the content of a solid content being less than 10% for a long time and productivity falls, and the concavo-convex pattern of female mold is not imprinted with a sufficient precision, it is not desirable.

[0007] Especially as a hydraulic raw material, it is not limited but the mixture of hydraulic raw materials, such as a slag, plaster, cement, and slaked lime, lightweight-ized material, such as a perlite, and charges of reinforcing materials, such as pulp fiber and a wollastonite, is specifically illustrated. After the hydraulic raw material of the shape of this slurry is supplied to a front face at the female mold which has a concavo-convex pattern, a preliminary press is carried out by female mold, an outer frame, and the punch, and it is formed in a preforming object. The concavo-convex pattern of female mold is imprinted by the minerals fabrication board, and a target pattern is used. Especially, the thing of the pattern of deep drawing with the large difference of a crevice and heights is desirable.

[0008] As the quality of the material of female mold, although a metal can also be used, a fiber strengthening resin is desirable in respect of cost. The aforementioned punch has two or more stomata which carry out opening to the front face (field which contacts a hydraulic raw material), and each stoma is connected with vacuum devices. During the pressurization of a preliminary press, the redundant water in a hydraulic raw material reaches automatically by this stoma, or is removed compulsorily. When removing compulsorily, it carries out by decompressing the inside of vacuum devices to -700 - -1000mmHg.

[0009] On the other hand, the outer frame used with a preliminary press has the stoma which carries out opening to a circumference side (field which contacts a hydraulic raw material), and the redundant water in a hydraulic raw material is removed also from this stoma during a preliminary press. This stoma is located in the range of 50mm from the edge which touches the female mold of a circumference side, and it is desirable that paths are 0.5-2.5mm and 3 - 50% of hole density. When removing compulsorily, it carries out by decompressing the inside of vacuum devices to -700 - -1000mmHg.

[0010] Moreover, since mold collapse had arisen at the time of evacuation of a punch, and conveyance of a preforming object when the longitudinal section of the aforementioned preforming object was formed in the rectangle configuration, in this invention, the taper-like taper side was formed in the inner skin (field which contacts a hydraulic raw material) of the

aforementioned outer frame towards the aforementioned punch, and the longitudinal section of a preforming object was formed in it at the trapezoid configuration. Thereby, mold collapse of a preforming object can be prevented.

[0011] As conditions for a preliminary press, it is the temperature of ordinary temperature - 50 degreeC, and 1-5kg pile/cm2. They are a pressure and a press time grade for 3 - 120 seconds. the circumference side (field which contacts a hydraulic raw material) of the outer frame used with a preliminary press at this time — the redundant water in a hydraulic raw material — nature — and — or the water-content field to the solid content which it becomes possible to reduce the pressure generated during a preliminary press, and can maintain the configuration after a preliminary press spreads by removing compulsorily from about 50 - 200% to about 50 - 250% It becomes possible to shorten the time which a preliminary press takes in this way, and productivity becomes good.

[0012] Subsequently, an actual press is carried out and this preforming object is manufactured by the hydraulic minerals fabrication board. What usually used the female mold in this press and the punch with a preliminary press is used. As conditions for this press, it is the temperature of ordinary temperature - 50 degreeC, and 10-150kg pile/cm2. They are a pressure and a time grade for 1 - 120 seconds. It is desirable to reach automatically or to remove a redundant water from a punch compulsorily also in this press of this.

[0013] The hydraulic minerals fabrication board manufactured in this way is completely hardened by regimen. It is desirable when carrying out wet curing under the maximum vapor tension of 60-80 degreeC for 6 to 10 hours, and carrying out autoclave curing as this regimen method with further 150-180 degreeC and four to 10 atmospheric pressure raises productivity. In this wet curing, where female mold is equipped with a hydraulic minerals fabrication board, after being reversed, female mold is removed and deformation of a pattern and a hydraulic minerals fabrication board can be prevented by accumulating on a tray and subsequently, recuperating oneself in this hydraulic minerals fabrication board, so that it may have space mutually.

[0014] Although the same equipment may be used for the press equipment used for a preliminary press and this press, it is desirable to form both equipments separately. Since the pressure generated from this press is small, the reason has [ a preliminary press ] a cheap installation cost. And it is because a manufacturing cost will become high if a preliminary press performs a preliminary press and this press with the same equipment, since the time which a press takes is generally longer than this press. It is more desirable to form two or more equipments of a preliminary press to one equipment of this press.

[0015] (Example of comparison) Except having used what does not have a stoma for the circumference side as an outer frame, the same hydraulic raw material as an example was used, and the preliminary press was carried out by the same method. In this case, press time until the water content of the preforming object 22 becomes about 150% was required for 60 seconds.

[0016]

[Embodiments of the Invention] It explains in full detail about the gestalt of desirable implementation of the manufacture method of the hydraulic minerals fabrication board applied to this invention according to an accompanying drawing below. Drawing 1 is process drawing showing the manufacture method of the hydraulic minerals fabrication board concerning the gestalt of operation of this invention. First, after fixing the female mold 12 which has a concavo-convex pattern on a plate 10, an outer frame 14 is fixed to this female mold, and the hydraulic raw material 16 is supplied in the container formed by female mold 12 and the outer frame 14. And by the punch 20 of preliminary press equipment 18, the preliminary press of the aforementioned hydraulic raw material 16 is carried out, and the preforming object 22 is formed.

[0017] By the way, as the aforementioned outer frame 14 is shown in drawing 2, the taper-like taper side 24 is formed in inner skin towards the aforementioned punch 20, and, thereby, as for the preforming object 22, the longitudinal section is formed in a trapezoid configuration. Therefore, mold collapse does not produce the aforementioned preforming object 22 at the time of evacuation movement of a punch 20, and conveyance of the preforming object 22. moreover, dehydration whose aperture the punching metal 26 whose aperture is about 0.5-2mm fixes to the inner skin of an outer frame 14, and is about 5-30mm further at the circumference section of an outer frame 14 — much holes 28 and 28 — are formed thereby — the redundant water in the hydraulic raw material 16 — the aforementioned punching metal 26 and dehydration — it is removed to the exterior of an outer frame 14 through a hole 28 and 28 — in addition, the aforementioned dehydration — if the vacuum of the vacuum devices is connected and carried out to a hole 28 and 28 —, the aforementioned redundant water is compulsorily removable

[0018] As the aforementioned preliminary press equipment 18 is shown in this drawing, a top board 32 is fixed to the lower part of the rod 30 of an oil hydraulic cylinder, and the dehydration box 34 is attached in the lower part of this top board 32. The porosity material 36, such as a punching plate which constitutes the aforementioned punch 20, a perforated plate, or a wire gauze, is attached in the inferior surface of tongue (field which contacts the hydraulic raw material 16) of the aforementioned dehydration box 34. Moreover, the dehydration box 34 is connected to the vacuum devices which are not illustrated. Therefore, if downward movement of the aforementioned preliminary press equipment 18 is carried out, and the aforementioned porosity material 36 is forced on the oil level of the hydraulic raw material 16 and vacuum devices are operated, the redundant water in the hydraulic raw material 16 will be removed compulsorily also from the upper surface of the hydraulic raw material 16.

[0019] In drawing 1, the preforming object 22 by which the outer frame 14 was removed is conveyed under this press equipment 38. At this time, since the longitudinal section is formed in the trapezoid configuration, the mold collapse of the preforming object 22 is not carried out. And a redundant water is compulsorily dehydrated by it and the preforming object 22 is manufactured by the hydraulic minerals fabrication board 42 by it while the last press is carried out by the cope box 40 of this press equipment 38.

[0020] Thus, with the gestalt of this operation, since the redundant water in the hydraulic raw material 16 was removed from the circumference side of an outer frame 14 and preliminary press time was shortened during the preliminary press, productivity improves.

[0021]

[Example] As a hydraulic raw material, it mixed at a rate of 30 % of the weight of cement, 40 % of the weight of silica powder, 10 % of the weight of pearlites, 10 % of the weight of pulp fiber, 5 % of the weight of minerals aggregates, and 5 % of the weight of minerals admixtures, water was added to this, and the solid content prepared the hydraulic raw material of the shape of about 20% of the weight of a slurry.

[0022] Subsequently, it supplied into the outer frame which has a stoma in the circumference side (field which contacts a

hydraulic raw material) installed in the hydraulic raw material of the shape of this slurry on the female mold which has a concavo-convex pattern. As for the concavo-convex pattern of this female mold, the crevice was prepared irregularly, and the greatest depth was 8mm. Subsequently, by the punch and female mold which are punctured on a front face (field which contacts a hydraulic raw material), the stoma performed the preliminary press and formed the preforming object. At the time of a preliminary press, the stoma of a punch was connected to vacuum devices, it decompressed so that the pressure might be set to -500mmHg, and the redundant water in a hydraulic raw material was compulsorily removed from the stoma of a punch from the stoma of the circumference side of an outer frame to nature. The conditions of this preliminary press are ordinary temperature, and are 2 5kg a pile/cm. It pressurized for 10 seconds by the pressure. Moreover, the diameters of a stoma of a circumference [ outer frame ] side were 1.6mm and 5% of hole density.

[0023] The water content of the preforming object formed in this way was about 150% to the solid content. Subsequently, where female mold is equipped with this preforming object, it moved to this press equipment, and the actual press was pressurized and carried out by this female mold and the punch with which this press equipment is equipped. Also in this press, the punch removed the redundant water compulsorily. The conditions of this press are 2 50kg a pile/cm at ordinary temperature. It pressurized for 10 seconds by the pressure.

[0024] Female mold was removed, after being reversed, where female mold is equipped with the hydraulic minerals fabrication board formed in this way. Subsequently, after having accumulated this hydraulic minerals fabrication board on the tray so that it might have space mutually, and recuperating oneself by 80 degreeC saturated-steam pressing down for 8 hours, it inserted in the autoclave further, and by 160 degreeC, a himself was recuperated for 15 hours and it hardened.

[Comparative Example(s)] The preliminary press was carried out by the same method using the same hydraulic raw material as an example except having used what does not have a stoma for the circumference side as an outer frame. Press time until the water content of the preforming object 22 becomes about 150% was required for 60 seconds.

[0025]

[Effect of the Invention] According to the manufacture method of the hydraulic minerals fabrication board applied to this invention as explained above Since it was made to perform a preliminary press, having formed the stoma in the circumference side of the outer frame installed on the female mold which has a concavo-convex pattern, and removing the redundant water of a hydraulic raw material also from this stoma The water-content field to the solid content which the pressure generated during a preliminary press can be reduced, and can maintain the configuration after a preliminary press can be extended to about 50 - 250%. Therefore, since the time which a preliminary press takes can be shortened, a hydraulic minerals fabrication board can be manufactured with sufficient productivity.

---

[Translation done.]

(19)日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11)特許出願公開番号

特開平9-141624

(43)公開日 平成9年(1997)6月3日

(51)Int.Cl. <sup>6</sup>	識別記号	庁内整理番号	F I	技術表示箇所
B 2 8 B	1/26		B 2 8 B	1/26
	3/02			3/02
				J

審査請求 未請求 請求項の数3 O L (全 4 頁)

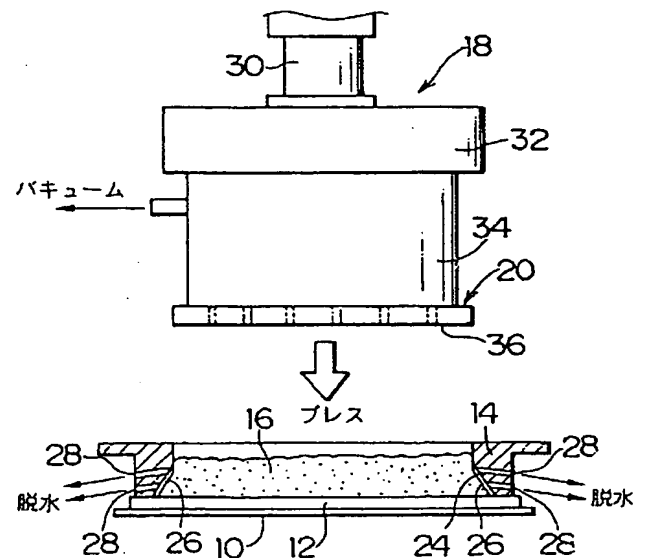
(21)出願番号	特願平7-303138	(71)出願人	000000044 旭硝子株式会社 東京都千代田区丸の内2丁目1番2号
(22)出願日	平成7年(1995)11月21日	(72)発明者	清沢 基紀 神奈川県横浜市鶴見区末広町1丁目1番地 旭硝子株式会社京浜工場内
		(72)発明者	松田 達行 神奈川県横浜市鶴見区末広町1丁目1番地 旭硝子株式会社京浜工場内
		(72)発明者	隅越 正志 茨城県鹿島郡神栖町大字東和田25番地 旭 硝子株式会社鹿島工場内
		(74)代理人	弁理士 松浦 憲三

(54)【発明の名称】 水硬性無機質成形板の製造方法

(57)【要約】

【課題】予備プレスに要する時間が短縮するので、水硬性無機質成形板の生産性が向上する。

【解決手段】凹凸模様を有する下型にスラリー状の水硬性原料を供給し、上型及び外枠周囲面から余剰水を除去しつつ予備プレスして予備成形体を形成し、次いで、予備成形体を本プレスして前記下型の凹凸模様が転写された表面形状の水硬性無機質成形板を製造する。



## 【特許請求の範囲】

【請求項 1】 凹凸模様が有する下型にスラリー状の水硬性原料を供給し、上型及び外枠の脱水孔から余剰水を除去しつつ予備プレスして予備成形体を形成し、次いで、前記予備成形体を本プレスして前記下型の凹凸模様が転写された表面形状の水硬性無機質成形板を製造することを特徴とする水硬性無機質成形板の製造方法。

【請求項 2】 前記上型には真空装置に接続された多孔質板が設けられ、該多孔質板を介して前記余剰水を吸引除去すると共に、前記外枠の脱水孔は、外枠周囲面に形成された多数の貫通孔であることを特徴とする請求項 1 記載の水硬性無機質成形板の製造方法。

【請求項 3】 前記外枠の内周面に、前記上型に向けて先細状のテーパ面を形成し、前記予備成形体の縦断面を台形状に形成することにより、予備成形体の型崩れを防止したことを特徴とする請求項 1 記載の水硬性無機質成形板の製造方法。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、住宅用外壁材として用いられる水硬性無機質成形板の製造方法に関する。

【0002】

【従来の技術】 表面に凹凸模様が有する水硬性無機質成形板の製造方法は、一般に下型にスラリー状の水硬性原料を供給し、下型から予備脱水した後、表面に凹凸模様が有する上型で加圧脱水する方法が知られている。

【0003】

【発明が解決しようとする課題】 しかしながら、前記従来の水硬性無機質成形板の製造方法では、上型の凹凸模様が成形体に精度良く転写されず表面意匠性の点で不十分であり、深絞り模様の場合は精度が特に悪くなるという欠点がある。これに対して、本願出願人は、凹凸模様が有する下型にスラリー状の水硬性原料を供給し、上型から余剰水を自然及び又は強制的に除去しつつ予備プレスして予備成形体を形成し、次いで、予備成形体を本プレスして下型模様が転写された表面形状の水硬性無機質成形板を製造する製造方法を提案している（特願平 7-33972 号）。

【0004】 しかし、前記製造方法では、表面意匠性を向上させることができるが、水硬性原料の余剰水を除去するのに長時間かかるので、生産性が低いという欠点がある。本発明はこのような事情に鑑みてなされたもので、意匠性に優れた水硬性無機質成形板を生産性良く製造することができる水硬性無機質成形板の製造方法を提供することを目的とする。

【0005】

【課題を解決するための手段】 本発明は、前記目的を達成する為に、凹凸模様が有する下型にスラリー状の水硬性原料を供給し、上型及び外枠の脱水孔から余剰水を除去しつつ予備プレスして予備成形体を形成し、次いで、前

2

記予備成形体を本プレスして前記下型の凹凸模様が転写された表面形状の水硬性無機質成形板を製造することを特徴としている。

【0006】 本発明において、下型にスラリー状の水硬性原料を供給するにあたり、水硬性原料を固形分が 10～30 重量%になるように調整して使用するのが好ましい。固形分の含有量が 10%未満であると脱水に長時間必要になり、生産性が低下するので好ましくなく、30%超であると流動性が低下し下型の凹凸模様が精度良く転写されないのが好ましくない。

【0007】 水硬性原料としては、特に限定されず、具体的にはスラグ、石膏、セメント、消石灰等の水硬性原料とパーライト等の軽量化材料とパルプ繊維、ウオラストナイト等の補強材料との混合物が例示される。かかるスラリー状の水硬性原料は、表面に凹凸模様が有する下型に供給された後、下型、外枠及び上型により予備プレスされ予備成形体に形成される。下型の凹凸模様は、無機質成形板に転写されるものであり、目的とする模様が使用される。なかでも、凹部と凸部との差が大きい深絞りの模様のものが好ましい。

【0008】 下型の材質としては、金属も使用できるが、繊維強化樹脂がコストの面で好ましい。前記上型は、その表面（水硬性原料に当接する面）に開口する複数の小孔を有し、各小孔は真空装置に連結されている。予備プレスの加圧中に、水硬性原料中の余剰水はこの小孔により自然及び又は強制的に除去される。強制的に除去する場合は、真空装置内を $-700 \sim -1000 \text{ mmHg}$ に減圧することにより行う。

【0009】 一方、予備プレスで用いる外枠は、周囲面（水硬性原料に当接する面）に開口する小孔を有し、予備プレス中に、水硬性原料中の余剰水はこの小孔からも除去される。この小孔は、周囲面の下型に接する端から 50mm の範囲に位置し、径が 0.5～2.5mm、開孔率 3～50%であるのが好ましい。強制的に除去する場合は、真空装置内を $-700 \sim -1000 \text{ mmHg}$ に減圧することにより行う。

【0010】 また、前記予備成形体の縦断面を長方形形状に形成すると、上型の退避時や予備成形体の搬送時に型崩れが生じていたため、本発明では前記外枠の内周面（水硬性原料に当接する面）に、前記上型に向けて先細状のテーパ面を形成し、予備成形体の縦断面を台形状に形成した。これにより、予備成形体の型崩れを防止することができる。

【0011】 予備プレスの条件としては、常温 $\sim 50^{\circ}\text{C}$ の温度、 $1 \sim 5 \text{ kg/cm}^2$ の圧力及び 3～120 秒の押圧時間程度である。この時、予備プレスで用いる外枠の周囲面（水硬性原料に当接する面）により水硬性原料中の余剰水を自然及び又は強制的に除去することにより、予備プレス中に発生する圧力を低減させることが可能となり、また、予備プレス後の形状を維持すること

が可能な固形分に対する含水率領域が50~200%程度から50~250%程度に広がる。かくして予備プレスに要する時間を短縮させることが可能となり生産性が良くなる。

【0012】次いで、かかる予備成形体は本プレスされ、水硬性無機質成形板に製造される。本プレスにおける下型、上型は通常、予備プレスで使用したものが使用される。本プレスの条件としては、常温~50°Cの温度、10~150kg重/cm<sup>2</sup>の圧力及び1~120秒の時間程度である。この本プレスにおいても上型から余剰水を自然及び又は強制的に除去することが好ましい。

【0013】かくして製造された水硬性無機質成形板は養生により完全に硬化される。この養生方法としては、60~80°Cの飽和蒸気圧下で6~10時間湿潤養生し、更に150~180°C、4~10気圧でオートクレーブ養生することが生産性を高める上で望ましい。この湿潤養生において、水硬性無機質成形板を下型が装着された状態で反転した後、下型を外し、ついで、この水硬性無機質成形板を互いに空間を有するようにトレイに積み上げて養生することで、模様及び水硬性無機質成形板の変形を防止できる。

【0014】予備プレス、本プレスに使用するプレス装置は、同一の装置を使用しても良いが、両装置を別々に設けることが好ましい。その理由は、予備プレスは本プレスより発生する圧力が小さいので設備費が安い。しかも、予備プレスは本プレスよりプレスに要する時間が一般的に長いので、同一の装置で予備プレスと本プレスを行うと製造コストが高くなるからである。本プレスの装置1台に対し予備プレスの装置を複数台設けることがより好ましい。

【0015】(比較例) 外枠として、その周囲面に小孔を有しないものを使用した以外、実施例と同様の水硬性原料を使用し、同様の方法で予備プレスした。この場合、予備成形体22の含水率が約150%になるまでの押圧時間は60秒間要した。

【0016】

【発明の実施の形態】以下添付図面に従って本発明に係る水硬性無機質成形板の製造方法の好ましい実施の形態について詳説する。図1は、本発明の実施の形態に係る水硬性無機質成形板の製造方法を示す工程図である。先ず、プレート10上に、凹凸模様を有する下型12を固定したのち、この下型に外枠14を固定して、下型12と外枠14とで形成される容器内に水硬性原料16を供給する。そして、予備プレス装置18の上型20によって前記水硬性原料16を予備プレスして、予備成形体22を形成する。

【0017】ところで、前記外枠14は図2に示すように、内周面に前記上型20に向けて先細状のテーパ面24が形成され、これにより予備成形体22は縦断面が台

形形状に形成される。従って、前記予備成形体22は、上型20の退避移動時や予備成形体22の搬送時に型崩れが生じない。また、外枠14の内周面には、孔径が0.5~2mm程度のパンチングメタル26が固着され、更に外枠14の周囲部には孔径が5~30mm程度の脱水孔28、28…が多数形成されている。これにより、水硬性原料16中の余剰水は前記パンチングメタル26、脱水孔28、28…を介して外枠14の外部に除去される。尚、前記脱水孔28、28…に真空装置を接続してバキュームすれば、前記余剰水を強制的に除去することができる。

【0018】前記予備プレス装置18は同図に示すように、油圧シリンダのロッド30の下部に上定盤32が固定され、この上定盤32の下部に脱水ボックス34が取り付けられている。前記脱水ボックス34の下面(水硬性原料16と当接する面)には、前記上型20を構成するパンチングプレート、多孔板、又は金網等の多孔質材36が取り付けられている。また、脱水ボックス34は図示しない真空装置に接続されている。従って、前記予備プレス装置18を下降移動させて前記多孔質材36を水硬性原料16の液面に押し付け、そして、真空装置を作動すると、水硬性原料16中の余剰水が水硬性原料16の上面からも強制的に除去される。

【0019】図1において、外枠14が取り外された予備成形体22は、本プレス装置38の下方に搬送される。この時、予備成形体22は、縦断面が台形形状に形成されているので型崩れしない。そして、予備成形体22は本プレス装置38の上枠40によって、最終プレスされると共に余剰水が強制的に脱水されて水硬性無機質成形板42に製造される。

【0020】このように、本実施の形態では、予備プレス中に、水硬性原料16中の余剰水を外枠14の周囲面からも除去して予備プレス時間を短縮したので、生産性が向上する。

【0021】

【実施例】水硬性原料として、セメント30重量%、珪石粉末40重量%、パーライト10重量%、パルプ繊維10重量%、無機質骨材5重量%、無機質混和剤5重量%の割合で混合し、これに水を添加し、固形分が約20重量%のスラリー状の水硬性原料を調製した。

【0022】次いで、このスラリー状の水硬性原料を凹凸模様を有する下型上に設置された、周囲面(水硬性原料に当接する面)に小孔を有する外枠の中に供給した。この下型の凹凸模様は、凹部が不規則に設けられ、その最大の深さは8mmであった。次いで、小孔が表面(水硬性原料に当接する面)に開孔する上型と下型とによって予備プレスを行い予備成形体を形成した。予備プレスの際、上型の小孔を真空装置に接続し、その圧力が-500mmHgになるように減圧し、水硬性原料中の余剰水を上型の小孔から強制的に、また、外枠の周囲面の小



孔から自然に除去した。この予備プレスの条件は、常温で、 $5 \text{ kg 重/cm}^2$  の圧力で10秒間加圧した。また、外枠周囲面の小孔径は1.6mm、開孔率5%であった。

【0023】かくして形成された予備成形体の含水率は固形分に対して約150%であった。次いで、この予備成形体を下型が装着された状態で本プレス装置へ移動し、この下型と本プレス装置に装着されている上型によって加圧し、本プレスした。本プレスにおいても上型により余剰水を強制的に除去した。本プレスの条件は、常温で $50 \text{ kg 重/cm}^2$  の圧力で10秒間加圧した。

【0024】かくして形成された水硬性無機質成形板を下型が装着された状態で反転した後、下型を外した。次いで、この水硬性無機質成形板を互いに空間を有するようにトレイに積み上げ、 $80^\circ \text{C}$  飽和水蒸気圧下で8時間養生した後、更にオートクレーブに挿入して $160^\circ \text{C}$  で15時間養生し硬化した。

【比較例】外枠としてその周囲面に小孔を有しないものを使用した以外、実施例と同様の水硬性原料を使用し同様の方法で予備プレスした。予備成形体22の含水率が約150%になるまでの押圧時間は60秒間要した。

【0025】

【発明の効果】以上説明したように本発明に係る水硬性無機質成形板の製造方法によれば、凹凸模様を有する下型上に設置した外枠の周囲面に小孔を形成し、この小孔からも水硬性原料の余剰水を除去しながら予備プレスを行うようにしたので、予備プレス中に発生する圧力を低減させることができ、また、予備プレス後の形状を維持することが可能な固形分に対する含水率領域を50~250%程度に広げることができる。従って、予備プレスに要する時間を短縮できるので、生産性良く水硬性無機質成形板を製造することができる。

【図面の簡単な説明】

【図1】本発明の実施例に係る水硬性無機質成形板の製造工程図

【図2】外枠の断面形状を示す説明図

【符号の説明】

12…下型

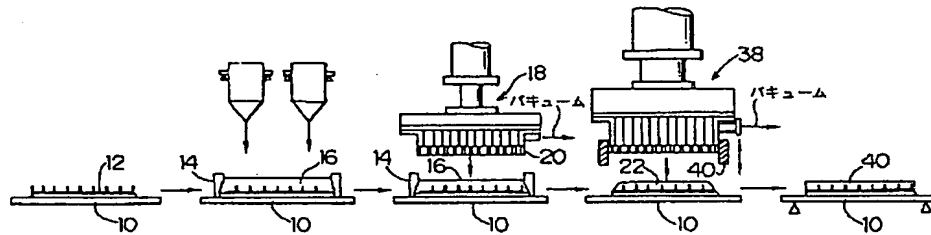
14…外枠

16…水硬性原料

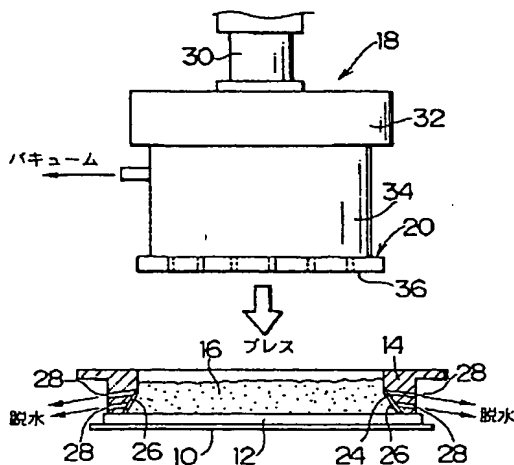
18…予備プレス装置

38…本プレス装置

【図1】



【図2】



## MANUFACTURE OF HYDRAULIC INORGANIC MOLDED PLATE

Patent Number: JP9141624  
Publication date: 1997-06-03  
Inventor(s): KIYOZAWA MOTOKI;; MATSUDA TATSUYUKI;; SUMIKOSHI MASASHI  
Applicant(s): ASahi GLASS CO LTD  
Requested Patent: ☐ JP9141624  
Application Number: JP19950303138 19951121  
Priority Number(s):  
IPC Classification: B28B1/26; B28B3/02  
EC Classification:  
Equivalents:

---

### Abstract

---

**PROBLEM TO BE SOLVED:** To manufacture a hydraulic inorganic molded plate excellent in designedness with a high productivity by a method wherein slurry-like hydraulic stock is fed in a bottom mold having an uneven pattern so as to be formed into a pre-molded body by being pre-pressed and finally normally pressed, resulting in transferring the uneven pattern of the bottom mold.

**SOLUTION:** First of all, after a bottom mold 12 having an uneven pattern is fixed onto a plate 10, an outer frame 14 is fixed to the bottom mold 12 so as to place hydraulic stock 16 in a container made of the bottom mold 12 and the outer frame 14. After that, a pre-molded body 22 is formed by pre-pressing the hydraulic stock 16 with the top mold 20 of a pre-pressing device. The excess water in the hydraulic stock 16 is removed outside the outer frame 14 through a punching metal and dehydrating holes. Next, after the outer frame 14 is moved, the pre-molded body 22 is carried below a normal pressing device 38 so as to be finally pressed with the upper frame 40 of the normal pressing device 38 accompanied by the forcible dehydration of excess water in order to be turned into a hydraulic inorganic molded plate 42.

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☒ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**